Kazuko M. EMURA (HASEGAWA)*: A supplementary note on cytotaxonomy of *Cimicifuga foetida* from the Himalayas

江村（長谷川）一子*：ヒマラヤ産コウライショウマの細胞分類学的研究（追補）

It was previously reported that *Cimicifuga foetida* L. from Thimphu, Bhutan was tetraploid, and was suggested that the species in the Himalayas, Yunnan and Burma might be tetraploid and that those in the area of Korea, Manchuria, Siberia and Europe might be diploid, based on the morphological studies especially on the variations of the size of stomata and pollen grains. Recently, the other Himalayan materials (TI, No. 69237, 69241) of *C. foetida* were fortunately collected from Kala-Pokhari, on the Singalila range of the Darjeeling District (Fig. 1) on July 13 & 21, 1969 by the 4th Botanical Expedition to Eastern Himalaya of the University of Tokyo.

The plants were, however, proved to be diploid, 2n=16 and n=8, contrary to my previous suggestion. I wish to supplement the previous report by the further study about those two Himalayan plants of *C. foetida*.

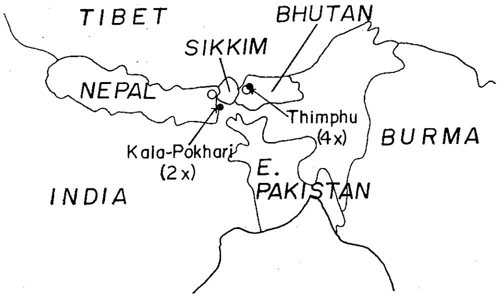

Fig. 1. A map showing the distribution of *C. foetida* in the Himalayas. Solid circles show the plants of diploid and tetraploid. Open circles show the plants cited in my previous paper and considered to be tetraploid.

The chromosomes of both gametic and somatic cells were observed from the young buds which were fixed with Newcomer's fluid and then stained with 45% aceto-carmine. The somatic chromosomes of ovular cells

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Table 1. Comparison between two chromosome races of *C. foetida* from the Himalayas.

Locality	Chromosome numbers n(PMC)	2n	Ploidy	Stomatal length (μ) (Mean of 60 stomata)	Pollen size (μ) (Mean of 30 young grains) P E
Kala-Pokhari (Singalila) TI, No. 69237	8	16 (ovule)	2×	57.6	17.8×17.7
TI, No. 69241	8	16 (ovule)	2×	58.1	
Thimphu (Bhutan)	16	32 (root-tip)	4×	68.6	22.4×21.5

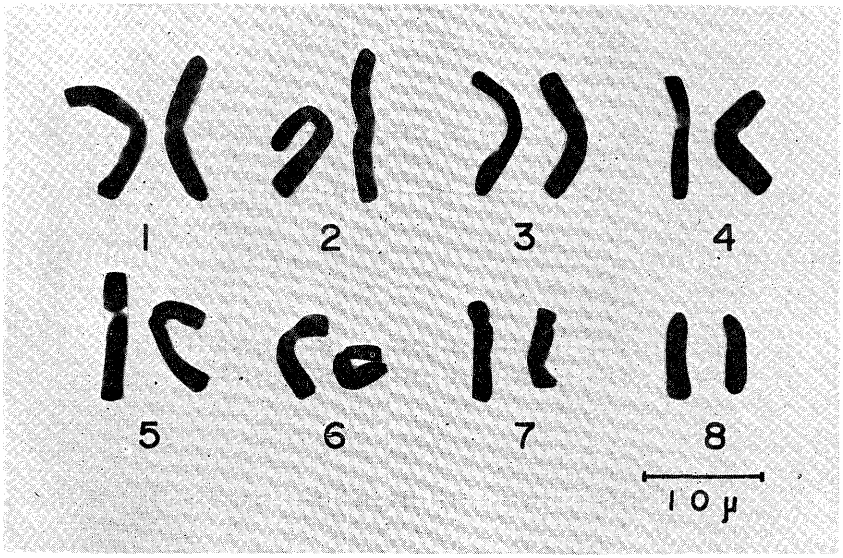

Fig. 2. Somatic chromosomes of *C. foetida* from Kala-Pokhari. A karyogram was produced from Fig. 3a.

are expressed as follows:

$$K(2n) = 16 = 8V + 6J + 2I \text{ (Fig. 2, 3a)}$$

No secondary constriction or satellite was observed. The karyotypes are almost similar to the reports from Germany by Langlet 1932, and from

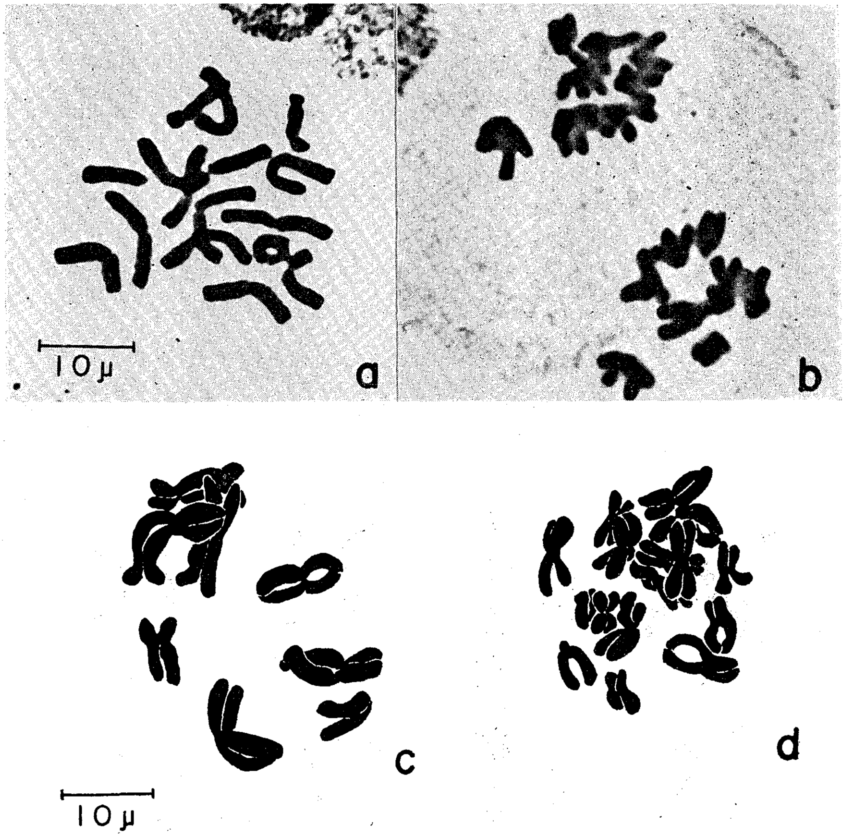

Fig. 3. a. Somatic chromosomes of diploid from Kala-Pokhari. b & c. Gametic chromosomes of diploid; b. Metaphase II, c. Metaphase I. d. Gametic chromosomes of tetraploid from Thimphu.

U. S. S. R. by Lewitsky 1941. The gametic chromosomes of PMC were n=8 as described by Langlet 1927, and the normal pairings were observed (Fig. 3b & c). The PMC chromosomes of the plants from Bhutan which had previously described to be 2n=32 in root-tip cells, were comparatively observed to be n=16, and the normal pairings were also observed (Fig. 3d).

Morphological variations between those two plants were studied as shown in Table 1, by dried or soaked specimens. The stomatal length of diploid is slightly but clearly smaller than that of tetraploid, however, not so small

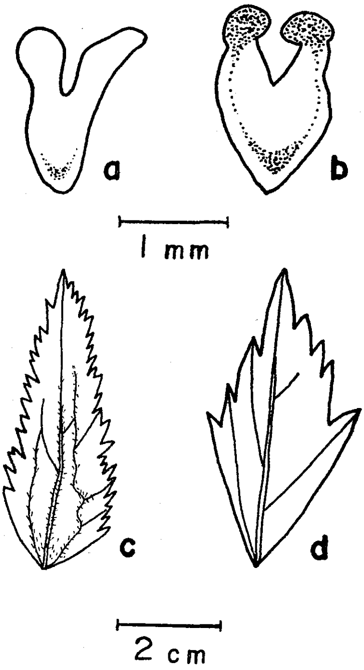

Fig. 4. Petals and lower surface of leaflets.
a. A petal of diploid. b. A petal of tetraploid. c. A leaflet of diploid. d. A leaflet of tetraploid.

as that of the plants from Korea, Siberia, Manchuria and Europe, reported previously. The pollen size of diploid is also smaller than that of tetraploid, as far as observed about very young grains from the buds. The petals of diploid are bilobed and two apices are flat and thin, on the other hand, those of tetraploid are also bilobed but the apices are more or less globular, something like a staminodium (Fig. 4a & b). The specimens of Belley La, Bhutan (KYO, No. 587 & 588) previously reported have also similar petals. The leaves are both triternate, and the leaflets of diploid are thin, finely serrate and sparsely pubescent on the lower surface, and those of tetraploid are thick, coarsely serrate and glabrous on both surfaces (Fig. 4c & d). No other variation was observed.

Those morphological variations are, however, very slight, as compared with the wide variations of *C. foetida* from the other regions, Yunnan, Manchuria, etc. as already reported. Considering within the Himalayan materials, the specimens cited in my previous paper (TI, No. 6300472. Diorali Bhanjang, Nepal; KYO, No. 587 & 588. Belley La, Bhutan (Fig. 1)) are similar to the tetraploid plants from Bhutan, and those morphological variations may be correlated with two chromosome numbers. After all, the two cytotypes of *C. foetida* were found from the Himalayas, however, they should not be distinguished as separate taxa under the present circumstances, because the characters which clearly separate the two plants have not been found and the materials of Asia especially from Yunnan need further comparative studies.

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Hara, Miss S. Kurosawa and Mr. H. Ohashi, the members of the 4th Botanical Expedition of the University of Tokyo, for placing the valuable collections from Kala-Pokhari of the Himalayas and a cultivated tetraploid plant from Karuizawa of Japan at my disposal.

Main literatures

Gregory, W. C. 1941. Trans. Amer. Philosoph. Soc. n. s. **31** : 441–521. Hara, H. 1966. The flora of Eastern Himalaya : 88. Hasegawa, K. M. 1969. Journ. Jap. Bot. **44** : 76–84. Langlet, O. 1927. Svensk Bot. Tidskr. **21** : 1–17. —— 1932. Svensk Bot. Tidskr. **26** : 381–400.

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前回の報告でヒマラヤ・ブータンのコウライショウマが4倍体である事，そしてヒマラヤ一雲南一帯に産するものはおそらく皆4倍体であろうと述べた。今回幸いにも東京大学の原寛教授と黒澤幸子氏及び大橋廣好氏の御好意によりヒマラヤの材料が新たに採集されたのでしらべてみると，先回の推測に反して2倍体（胚珠細胞 $2n=16$，PMC $n=8$）であった。この2倍体を先回の4倍体と比較したところ，気孔の大きさと花粉粒の大きさが幾分か4倍体の方が大きく，葉片や花弁の形質などもやや異ることが分った。しかし，前報にも述べた様にコウライショウマの形態の変異は著しく，それに比べればこの2植物間の変異はわずかなものである。ヒマラヤ地方においてはこの様な形質のわずかな変異が倍数性に関連しているのかもしれないが，分類学上この2倍体と4倍体を区別して扱うことは，今の段階では不可能と思われる。ただヒマラヤ地方にはコウライショウマの2倍体と4倍体の2つのサイトタイプの存在する事が明らかになったのでここに報告し，前報の一部を訂正，追補したい。

□**The Oxford book for food plants.** B-5版 pp. 206（内カラー図版95枚）Oxford University Press, London 1969. Oxford Series の内の一冊で，啓蒙書である。全世界の主要食用植物の着色図譜。図は Barbara Nicholson 女史の手に成り，2-数種づつを集めて描かれている。図柄は少し古めかしい印象があるけれども，精密で正確，それに美しいから充分に楽しみながらみることができる。対面には要領をえた記述がある。種類は穀類，砂糖原料，油脂，ナット，豆からはじめて果樹，根草，葉菜，瓜，香辛料等にわたるが，熱帯の果樹，欧州の果実類は主な品種も区別して描かれているし，西アフリカのバンバラビーンやアンデスの球根カタバミ等をも含んでいて，我々の目には新らしいものも多いから参考にも十分なる。定価55 s. 2,970円。

（前川文夫）